

Claims

1. A process for manufacturing (U,Pu)O₂ mixed
oxide nuclear fuel pellets,
- comprising:
* dosing and first blending (1) of PuO₂ and/or UO₂
powders and/or fuel manufacturing scrap;
* micronization (2) and forced sieving (3) of this
first blend;
* additional dosing and second blending (4) of the
first blend thus treated, UO₂ and possibly scrap;
* addition and blending of lubricants and/or
poreformers (5), separately or in combination with
the second blending step (4);
* pelletizing (6) of the second blend; and
* sintering (7) of the pellets thus formed; and
- furthermore comprising, for at least one
portion of the UO₂ powders:
* selection of non-free-flowing UO₂; and
* mechanical granulation treatment (29) of the UO₂
so as to make it free-flowing, before the UO₂ is
used as granules in at least said second blending
operation.
2. The process as claimed in claim 1,
characterized in that it comprises, for said
granulation treatment:
* compression (30) of the nonflowing UO₂ into
tablets at a pressure greater than that used for
the usual UO₂ granulation;
* crushing (31) of the tablets obtained, until a
flowing crushed material has been formed; and
* use of at least one portion of this flowing
crushed material for said second blending
operation (4).
3. The process as claimed in claim 2,
characterized in that the compression (30) is carried
out at a pressure of between 40 and 200 MPa.

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4. The process as claimed in claim 2, characterized in that a jaw crusher or a roll mill is used for the crushing step (31).

5. The process as claimed in any one of claims 1 to 4, characterized in that it furthermore comprises particle size selection by sieving (32) of the granulated UO_2 before it is used.

6. The process as claimed in claim 5, characterized in that the granulated UO_2 is separated, by the sieving (32), into at least two fractions of different particle sizes, the finest fraction possibly being introduced into the aforementioned first blending operation (1) whereas the other fraction is incorporated into the second blending operation (4).

7. The process as claimed in claim 1, characterized in that it comprises, in order to carry out said granulation of the non-free-flowing UO_2 , an operation to force the latter through a screen or sieve, the amount of additive(s), the mesh size of the screen or sieve and the pressure exerted on the powder all being adjusted so as to form granules having the appropriate properties.

8. The process as claimed in any one of claims 1 to 7, characterized in that, for said granulation of the non-free-flowing UO_2 , a lubricant is added to it.

9. The process as claimed in any one of claims 1 to 8, characterized in that, for said granulation of the non-free-flowing UO_2 , a binder is added to it.

10. The process as claimed in any one of claims 1 to 9, characterized in that the sintering (7) of the fuel pellets in an atmosphere of argon and hydrogen is carried out at a temperature between 1600 and 1760°C, the argon possibly being replaced with nitrogen.

11. The process as claimed in any one of claims 1 to 10, characterized in that, during the sintering (7), the oxygen partial pressure is adjusted, preferably by adjusting the $\text{H}_2/\text{H}_2\text{O}$ ratio in the flushing gas, in order to improve the interdiffusion of the PuO_2 and UO_2 oxides.

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